

Synthesis of Single Wall Carbon Nanotubes by Plasma Arc – Role of Plasma Parameters

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Abstract

Single wall carbon nanotubes (SWNT) are porous objects on the molecular scale and have a low density, which gives them potential applications as adsorbant for molecular hydrogen. Their H₂ absorption capacity published in the literature^{*,†,‡} varies from 4 to 10% by mass according to the purity of the materials and storage conditions. Optimization of production methods of SWNTs should permit improving these new materials for storage of hydrogen. In this article, we show the potential of using SWNTs in hydrogen storage. In particular, we pose problems associated with synthesis, purification, and opening up of the nanotubes. We present an electric arc process currently used at laboratory scale to produce single wall carbon nanotubes. We discuss, in particular, operating conditions that permit growth of nanotubes and some plasma parameters that assure control of the material. Analysis of the process is carried out with the aid of local measurements of temperature and scanning and transmission electron microscopy of the materials.

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